1. What are the session key findings? What are the new Lesson(s) learned / Scientific progress (since AR5 release, if relevant)?

Climate change can produce conflict, and conflict can produce climate change. For example, as resources such as water, become scarcer as global warming proceeds, and in cases where human population pressure adds to the demand, conflict can erupt, and even cross borders. This has produced revolutions recently, for example in Syria, and this danger will only get larger with global warming.

If a nuclear war occurred, even between new nuclear states using much less than 1% of the global nuclear arsenal, the resulting climate change (cooling and drying) could put a billion people could be at risk of starvation from the agricultural impacts of the smoke from the fires that could be generated by bombs dropped on cities and industrial areas. The current Russian and American nuclear arsenals can still produce a nuclear winter, with temperatures plummeting below freezing in the summer, sentencing most of the world to famine and starvation.

2. What are the major knowledge Gaps and Research Needs identified in the session?

We need to better merge political science, particularly study of conflict, with physical science to better understand threshold responses to water and food scarcity. This will also aid adaptation decisions to prevent conflict in response to climate change.

With respect to the impacts of nuclear war on climate, we need a research program, updating the nuclear winter studies from 30 years ago, taking into consideration the current nuclear arsenals and structures of megacities that would be targets, and taking advantage of advanced modern climate models and computer capabilities. While research to date has produced preliminary analyses of the climate response to one particular scenario of smoke injection, and the effects on some crops of the changes of temperature, precipitation, and sunlight, there are many details and impacts that need further study, in particular the amount of smoke that would be injected into the atmosphere, the impacts on the ocean of the climate and ultraviolet changes, and the impacts on agriculture of changing diffuse sunlight and ultraviolet radiation. The program needs to address the following questions:
a. What is the inventory of flammable material in potential target zones? How much soot would be produced from fires and firestorms after nuclear attack? More specifically, would multiple discrete fires in a large megacity coalesce into a larger firestorm, which would produce more soot than assumed by the recent studies?

b. How do soot particles get transported and modified by the atmosphere? What can we learn from the observed behavior of soot from forest fires? How would chemical and physical processes alter the particles in the stratosphere, and how would this affect their lifetimes and effects on radiation and climate?

c. What would be the climate response to a variety of nuclear conflict scenarios? How does the effect vary with different combatant groups, and with different attack scenarios? How would temperature, precipitation, sunlight, and ultraviolet radiation change? Are the preliminary results described above robust when tested with different climate models?

d. How would agricultural production, water resources, and the ocean biosphere change in response to the climatic disruption and enhanced ultraviolet radiation from nuclear war? How would the availability of food and water in each nation, including the United States, change as global markets and distribution systems react?

e. What would be the effects on human health and the natural environment of the changed availability of food and water and the enhanced ultraviolet radiation?

3. Did the session discuss/identify promising approaches in the fields of Adaptation and Mitigation, or both?

Not specifically.

4. Are there take-home messages from the session?

The basic message is that the greatest threat that humans pose to Earth from climate change is from the results of a nuclear war. We need rapid reductions of current nuclear arsenals to prevent the consequences of any deliberate or accidental use of these weapons so we can have the luxury of addressing the global warming problem.

5. Are there Important Quotes from the session?

6. Please include any other remark that you might have.